



This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 693989. .



**Encouraging Lifelong Learning
for an Inclusive & Vibrant Europe**

ENLIVEN- Encouraging Lifelong Learning for an Inclusive and Vibrant Europe

Horizon 2020, H2020- YOUNG-SOCIETY-2015, YOUNG-3-2105, Lifelong Learning for young adults: better policies for growth and inclusion in Europe

Duration: 01 October 2016- 30 September 2019

Deliverable 10.2

Deliverable Title: Policy Briefs on interim findings of ENLIVEN WPs to generate discussions with and feedback from policy makers

(This deliverable has been amended following reviewers’ comments. It now comprises three policy briefs.)

Deliverable type/version	Report
Dissemination level	Public
Month & date of delivery	31 st January 2019
Associated Work Package (WP)	10
Lead Beneficiary	UEDIN
WP Leader	Ellen Boeren
Authors	Sofie Cabus, Petya Ilieva-Trichkova, Miroslav Štefánik, Rong Qu, Claire Palmer, John Holford.
Project URL	https://h2020enliven.org/



EUROPEAN POLICY BRIEF



ENCOURAGING LIFELONG LEARNING FOR AN
INCLUSIVE & VIBRANT EUROPE

1ST OCTOBER 2016 – 30TH SEPTEMBER 2019

Barriers to adult participation in lifelong learning in a European policy context

ENLIVEN Policy Brief No. 1

January 2019

Sofie Cabus
Petya Ilieva-Trichkova
Miroslav Štefánik

INTRODUCTION

This is the first of two ENLIVEN Policy Briefs exploring the links between “system characteristics” (the relatively fixed features that derive from the institutions that structure particular societies) and adults’ participation in lifelong learning. They are based on two analytical reports focussed on disadvantaged social groups. This Policy Brief explores the *barriers* to lifelong learning participation: what hinders or prevents disadvantaged adult workers from learning.¹

The research reported in this policy brief was undertaken as part of ENLIVEN’s Work Package 4, coordinated by the University of Leuven.

¹ The Policy Brief is based on the first report, S. Cabus, P. Ilieva-Trichkova & M. Štefánik (2018), On the Barriers to Participation of Disadvantaged Adults in Lifelong Learning across 28 European countries (available at: <https://h2020enliven.org>). The second report (Cabus & Štefánik 2018), summarised in ENLIVEN Policy Brief No. 2, looks at the consequences of these barriers for the economy.

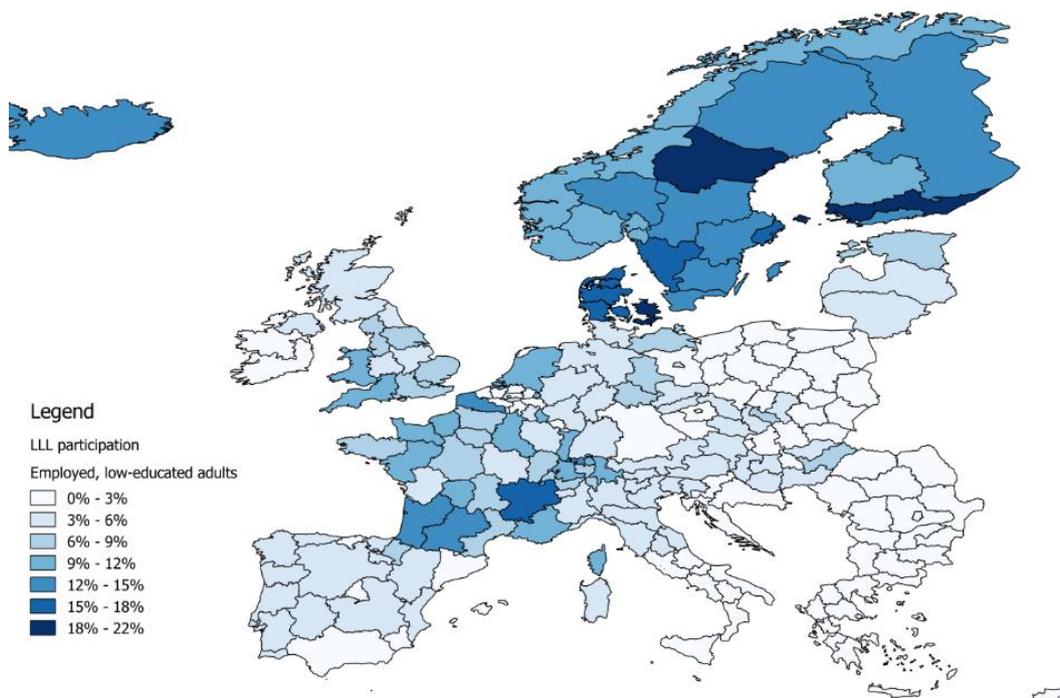
Our approach is innovative. We use a *supra-individual comparative framework* to cover the multiple layers of this complex problem. By doing so, we reveal those barriers (hindrances or “bounds”) that distinguish, across different societies, people who participate in lifelong learning from those who do not. Our research is based on data from 28 European Union member states, along with Iceland, Norway, and Switzerland.

Our empirical framework allows us to focus on European societies at regional level, rather than just countries as a whole. This means we recognise the large variations in participation rates between regions within individual countries (see Figure 1). Participation rates range from 0.7% in Sud-est and Sud-Vest Oltenia (Romania) to 35.6% in Zurich (Switzerland) (Eurostat; [trng_lfse_04]).

In addition, we address the influence system characteristics have across three disadvantaged groups: (a) employed low-educated adults; (b) employed low-educated young adults; and (c) employed migrants. We compare the barriers faced by these groups with those in the employed population overall.

Our main data source is the European Union Labour Force Survey (EU LFS). We processed data for six separate years: 2011 to 2016. EU LFS provides information about *NUTS-2 regions*, and so we have been able to examine the *administrative level* where regional policies are applied.² In addition to the EU LFS data, we have collected variables from Eurostat, the World Bank, UNESCO, and other reliable sources (e.g., Hofstede’s work on cultural dimensions of the value attached to learning). All variables have been gathered in one large database with over 80 variables. (The database is available from the author on request.)

Figure 1: Education and training participation rates among employed low-educated persons aged 25-64

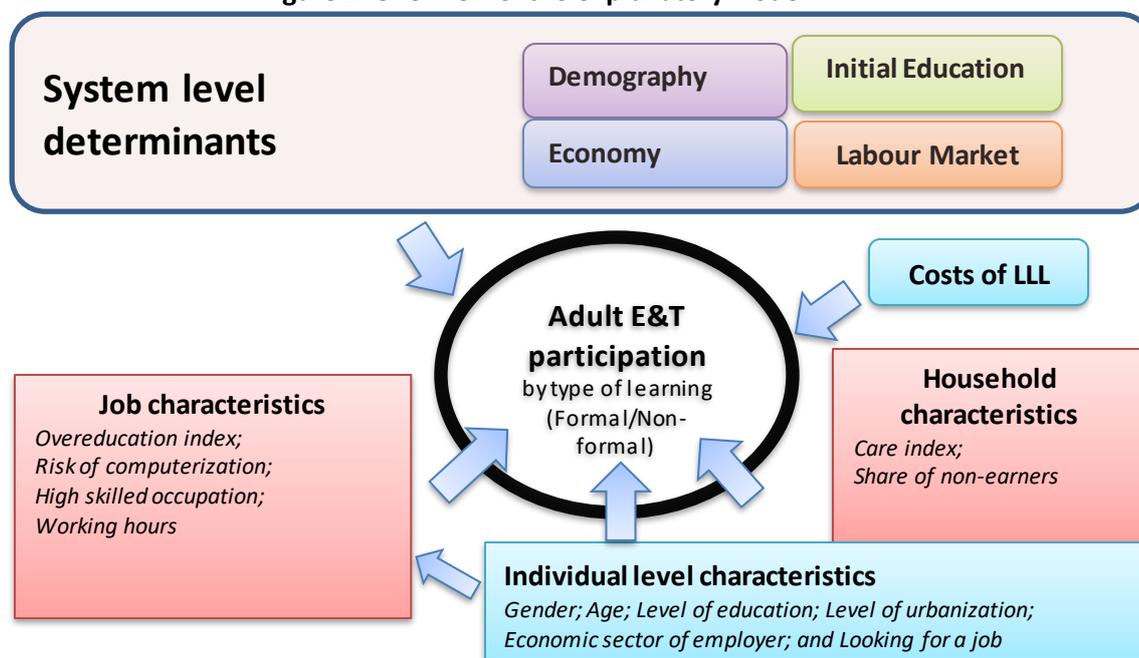


Source: ENLIVEN computation based on EU LFS 2011-2016

² NUTS-2 regions are typically smaller than countries (though in the case of a few small member states, national and NUTS-2 boundaries coincide). Estonia, e.g., comprises a single NUTS-2 region; Germany 38. NUTS is the acronym for Nomenclature of Territorial Units for Statistics (French: Nomenclature des unités territoriales statistiques).

Both individuals and societies as a whole benefit from adult education and training: on that the evidence is clear. However, participation in education and training varies significantly not only between countries and regions, but also between individuals, and policies often fail to take account of the real-life facts underlying this. Although we are not the first to ask why some people participate much less than others, our answer is methodologically innovative. Our explanation of variation in lifelong learning participation combines country, regional and individual levels (see Figure 2).³

Figure 2: Overview of the explanatory model



Source: Author.

The main findings are:

1. The organization of initial education shapes adult participation in education and training.

There is a positive association between the age children enter lower secondary education and their participation as adults in formal education and training (lifelong learning). This pattern is observed for all the disadvantaged groups we studied. Entry to secondary education is usually when specialisation begins, and we argue that general skills developed in initial education are potentially important for adults' engagement in formal lifelong learning.

Among low-educated and young low-educated adults, the age a person has left compulsory education increases the likelihood that they will participate in formal lifelong learning as an adult. Among migrants, however, the reverse applies: age of leaving compulsory education is associated with decreased adult participation. (The vocational orientation of a given educational system does not seem to have a significant effect on adult lifelong learning participation.)

2. Higher perceived costs of adult lifelong learning are linked to lower participation in formal learning.

Adults participate more often in lifelong learning when their employers pay for and provide *non-formal* lifelong learning opportunities at work. In contrast, with *formal* adult learning, there is a negative association between the costs of lifelong learning and participation rates among low-educated adults and low-educated young adults. It seems that when adult workers think lifelong learning is costly, they engage less in formal learning, but more in non-formal learning.

³ Results are based on data collected in 2016 from the EU LFS edition 2017. System characteristics were retrieved from online sources, e.g., Eurostat database, World Bank, and UNESCO.

3. Low-educated adults do not see formal lifelong learning as a way of improving their situation.

Employed adults with low levels of educational attainment are less likely to participate in lifelong learning. However, even if they underutilize the education they have achieved in their current jobs, they seldom seek to acquire more through formal adult lifelong learning—for example, to upgrade their qualifications to a higher level. In this they differ from medium- and highly-educated employees.

4. Caring (family) duties limit adult participation in lifelong learning.

When adults have to care for other family members (e.g., young children or seniors) they participate less in lifelong learning. (This is true even after controlling for working hours.) It is thus clear that caring duties directly limit employed adults' participation in lifelong learning. This applies to men and women – and the magnitude is comparable across the two sexes.

5. For employed adults, longer working hours mean less formal learning and more non-formal learning.

Non-formal learning most often happens at work, and the take-up of learning activities is strongly determined by the complexity of the job performed (e.g., health professionals) or job tasks (e.g., supervision). However, people with supervisory work roles are less likely to participate in formal learning.

6. Economic performance matters.

Adult lifelong learning participation does not – contrary to expectation – have an unambiguously positive association with the employment rate. However, there is a clear positive association between overall economic performance and degree of innovation.

POLICY IMPLICATIONS AND RECOMMENDATIONS

On the basis of our research we make four policy implications:

1. Support inclusive lifelong learning for adults.

While most adult lifelong learning is provided by employers, this is highly selective. Employers tend to provide lifelong learning to employees in more complex and less routinized occupations, and for those who have higher levels of initial education. This further intensifies the inequalities among workers. Those with lower levels of initial education, who work in more routine and less complex jobs, cannot benefit from much of the lifelong learning available.

Public policies should mitigate this polarization. Public support for human capital investment among highly-educated employees may involve high 'deadweight costs' (because employers would provide it anyway). Finding effective ways of involving the lower-educated, and those in less complex jobs, in employer-provided lifelong learning may bring positive economic gains. This is particularly important with growing computerisation of more routine tasks.

2. Actively develop outreach among lower-educated adults: they seldom see further education as a way of improving their life situation.

Those who have received, or achieved, less in their initial education participate less in lifelong learning during their later careers – although they might gain a lot from doing so. If they are in jobs where they underutilize their current education, they seldom seek to improve their situation by further formal learning. Lower-educated people are also more sensitive to higher costs of lifelong learning.

Active outreach among the lower-educated is, therefore, important for distributing publicly-supported adult lifelong learning. At present, this is usually done through active labour market policies. However, the current focus could be broadened from the unemployed alone to those employed in precarious or low-quality jobs (e.g. those at high risk of computerisation, or with poor working conditions).

3. Providing more general skills during initial education improves the inclusiveness of adult lifelong learning.

Ideally, inclusion in education or training should start young, to prevent students from developing negative feelings towards learning. Our research on system characteristics suggests two potential avenues:

- Raise the age when specialization into different educational ‘tracks’ takes place. Our research shows that the age when tracking occurs in secondary education is important.
- Prolong compulsory schooling. Longer compulsory schooling seems to keep the door to formal learning in adulthood open, especially among those who do not achieve higher-level outcomes during their initial education.

The evidence also shows that providing specific (vocational) skills during initial education does not reduce the need for adult lifelong learning. Countries with a higher share of students in vocational programmes do *not* behave differently in adult lifelong learning.

4. Monitoring should focus on regions.

Lifelong learning is high on the Education and Training 2020 Agenda. One of the headline targets is to have 15% of adults aged 25-64 enrolled in formal or non-formal learning. Although the large differences in lifelong learning participation rates among adults between European countries are well known, differences are even larger across European *regions*. Our research, based on detailed quantitative evidence, shows that monitoring should focus on regions in the European context. Regional level information can account for in-country variation in adult participation in lifelong learning. It also addresses the disaggregated level at which educational and labour market policies often take effect.

RESEARCH PARAMETERS

The ENLIVEN research models how policy interventions in adult education can become more effective. Different work packages focus on the role of governance and policy, participation, workplace learning and adults’ well-being. It implements and evaluates an innovative Intelligent Decision Support System and provides a new and more scientific underpinning for policy debate and decision-making on adult learning, especially for young adults. The project investigates these lifelong learning aspects through quantitative and qualitative analyses.

PROJECT IDENTITY

PROJECT NAME	Encouraging Lifelong learning for an Inclusive & Vibrant Europe (ENLIVEN)
COORDINATOR	Professor John Holford University of Nottingham, Nottingham, England, United Kingdom john.holford@nottingham.ac.uk
CONSORTIUM	3s Unternehmensberatung GmbH – Vienna, Austria Bulgarian Academy of Sciences – Institute for the Study of Societies and Knowledge – Sofia, Bulgaria KU Leuven/University of Leuven, Leuven – Belgium Slovak Academy of Sciences/ Slovenskej akadémie vied – Institute for Forecasting/Prognostický ústav – Bratislava, Slovakia Tallinn University/Tallinna Ülikool – Tallinn, Estonia Universidad De Deusto – Bilbao, Spain University of Edinburgh – Edinburgh, Scotland, United Kingdom University of Melbourne – Melbourne, Australia University of Nottingham – Nottingham, England, United Kingdom University of Verona/Università degli Studi di Verona – Verona, Italy
FUNDING SCHEME	European Union Horizon 2020 Framework Programme for Research and Innovation (2014-2020) – Societal Challenge 6 – Europe in a changing world: inclusive, innovative and reflective societies", call YOUNG-3-2015, topic "Encouraging Lifelong learning for an Inclusive and Vibrant Europe (ENLIVEN)" Grant Agreement No 693989
DURATION	October 2016 – September 2019 (36 months).
BUDGET	EU contribution: 2 499 788.50 €.
WEBSITE	https://h2020enliven.org/
FOR MORE INFORMATION	Contact: Professor John Holford, john.holford@nottingham.ac.uk Contact: Ruth Elmer, ruth.elmer@nottingham.ac.uk
FURTHER READING	Current and forthcoming publications from ENLIVEN that may be of interest to policymakers: <ul style="list-style-type: none">Boeren, E. (2017). Understanding adult lifelong learning participation as a layered problem. <i>Studies in Continuing Education</i> 39(2), pp. 161-175. https://www.tandfonline.com/doi/abs/10.1080/0158037X.2017.1310096Boydjchieva, P., & Ilieva-Trichkova, P. (published online, 11 Jan 2017). Between Inclusion and Fairness: Social Justice Perspective to Participation in Adult Education. <i>Adult Education Quarterly</i>, 67(2), pp. 91-117. https://doi.org/10.1177/0741713616685398Cabus, S.J. & Stefanik, M. (2018). Good Access to Lifelong Learning for the Low-Educated Accelerates Growth: Evidence from 23 European Countries. Available on ENLIVEN website: https://h2020enliven.org and at https://hiva.kuleuven.be/nl/nieuws/docs/hiva-wp2019-01-sofie-cabus.pdfCabus, S.J., Ilieva-Trichkova, P. & Stefanik, M. (2018). On the Barriers to Participation of Disadvantaged Adults in Lifelong Learning across 28 European countries. ENLIVEN Available on ENLIVEN website: https://h2020enliven.org.Räis, M.-L., & Saar, E. (2017). Participation in job-related training in European countries: The impact of skill supply and demand characteristics. <i>Journal of Education and Work</i>, 30(5), 531–551. doi: 10.1080/13639080.2016.1243229

EUROPEAN POLICYBRIEF

INTRODUCTION



ENCOURAGING LIFELONG LEARNING FOR AN
INCLUSIVE & VIBRANT EUROPE

1ST OCTOBER 2016 – 30TH SEPTEMBER 2019

Good access to adult education and training accelerates economic growth

ENLIVEN Policy Brief No. 2

Sofie Cabus

January 2019

This is the second of two ENLIVEN Policy Briefs which explore the connections between ‘system characteristics’ – relatively fixed features that derive from the institutions that structure particular societies – and adults’ participation in lifelong learning. They are based on two analytical reports we have prepared on these associations, focussing particularly on disadvantaged social groups. This Policy Brief examines the consequences for the economy of barriers to participation in lifelong learning.⁴

The research reported in this policy brief was undertaken as part of ENLIVEN’s Work Package 4, coordinated by the University of Leuven.

⁴ This Policy Brief is based on S.J. Cabus & M. Stefanik (2018), *Good Access to Lifelong Learning for the Low-Educated Accelerates Growth: Evidence from 23 European Countries* (available at <https://h2020enliven.org>). The other report, on the factors that hinder disadvantaged adults from engaging in lifelong learning, is summarised in ENLIVEN Policy Brief No. 1.

What benefits do inclusive lifelong learning policies for adults have for the economy as a whole? We investigated how accessible lifelong learning is for adults, and the impact of more inclusive participation on economic growth. Education and training are widely recognized as important determinants of national wealth, and it seems likely that if access to them is limited or unequal, economic growth will suffer. If so, fairness in adult lifelong learning matters not only for disadvantaged individuals and groups, but also for society as a whole: policies that improve educational prospects for disadvantaged people also improve the wealth of society as a whole.

We looked in particular at differences in access to adult lifelong learning between rich and poor, and between the lower and more highly educated. The focus is here on two disadvantaged groups, the poor and the low-educated. These are increasingly at risk of exclusion from the effects of 'skill-biased' innovation: as jobs and skills become obsolete, redundancy, dismissal, long-term unemployment and social exclusion threaten. Their learning opportunities are also limited because it is through work that many formal and non-formal learning activities become available. Employees mostly get opportunities for lifelong learning in or through the workplace.

Our main data source is the European Union Labour Force Survey (EU LFS). We processed data for six separate years: 2011 to 2016. Because EU LFS provides information about regions within countries, we can examine the administrative level where regional policies are applied.⁵ In addition to the EU LFS data, we collected variables from Eurostat, the World Bank, UNESCO, and other reliable sources (e.g., Hofstede's work on cultural dimensions on the value attached to learning). All variables have been gathered in one large database with over 80 variables.⁶

The main results are:

1. Inequality in access to adult lifelong learning between high- and low-educated adults significantly decreases economic growth (-0.42 percentage points, significant at 1 percent level). Inequality in access to lifelong learning between rich and poor adults decreases economic growth (-0.20 percentage points; though this estimate is not significant).

Social inequalities reflect unequal power relations within societies. These power relations influence how people interact with each other in the workplace, and they may lead to polarization over working conditions and methods of production. Polarization promotes routinized work, especially for the low-educated, and impedes the development of production methods based on trust, knowledge and innovation. High levels of inequality therefore tend to reduce the added value that employees contribute in the production process, and also to reduce their openness to innovation. This, in turn, can have a negative impact on economic growth.

2. Skills-biased technological change, which implies that technological progress only benefits the highly-educated, is not good for economic growth as a whole.

In highly competitive labour markets, capital-intensive firms have accelerated their investments in research and development (R&D) since the 2008 financial crisis. R&D generates technological

⁵ EU LFS provides information about NUTS-2 regions (typically smaller than countries, though in the case of a few small member states, national and NUTS-2 boundaries coincide). E.g., Estonia comprises a single NUTS-2 region; Germany contains 38). NUTS is the acronym for Nomenclature of Territorial Units for Statistics (French: *Nomenclature des unités territoriales statistiques*).

⁶ The database is available from the author on request. Panel data estimation techniques require the full dataset for the years 2011-2016.

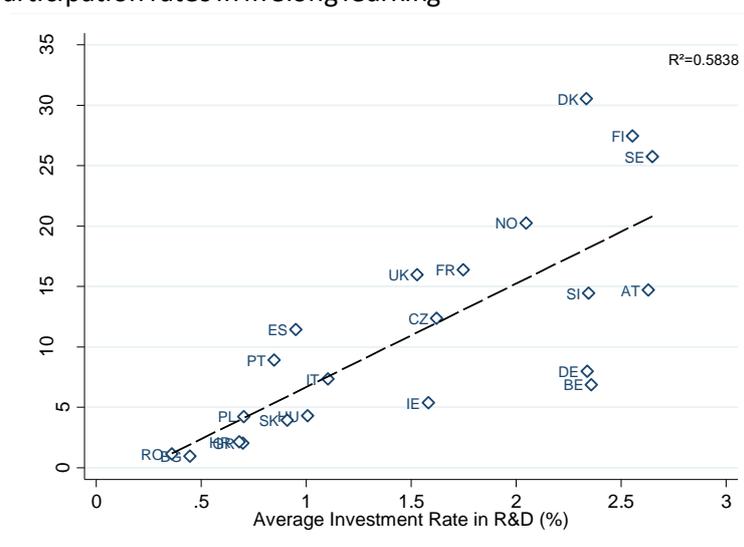
change, and technological change increases demand for highly-educated workers. The way technological change increases demand for highly-skilled employees has been called *skill-biased technological change*. Technological change is an important driver for highly-educated employees to engage in lifelong learning and thus keep abreast of new technologies. However, because technological change is not inclusive, this can have a negative impact on the economy as a whole.

3. The level of educational attainment in the population as a whole cannot explain why some countries excel – and others underperform – in adult lifelong learning participation.

In some European countries (such as Belgium and Germany) adult lifelong learning participation rates are much lower than their investment in R&D would lead us to expect (Figure 2). On the same basis, however, participation rates in Denmark, Finland, Sweden and some other countries are higher than would be expected. If lower-educated adults have more limited access to lifelong learning, we might expect societies with higher proportions of poorly-educated people also to have lower adult lifelong learning participation rates.

We found no direct support for this hypothesis. For example, Belgium’s average adult lifelong learning participation rate during 2011-2016 was 6.86 per cent, while Finland’s was 27.46 per cent. Based on the countries’ levels of educational attainment, these rates are predicted to be 16.00 and 17.14 per cent respectively. As such, Finland outperforms its starting position by over 10 percentage points, while Belgium underperforms by almost 10 percentage points. These differences between predicted and observed participation rates cannot be explained by Belgium’s lower overall level of educational attainment.

Figure 2: Relationship between R&D(1) and adult participation rates in lifelong learning



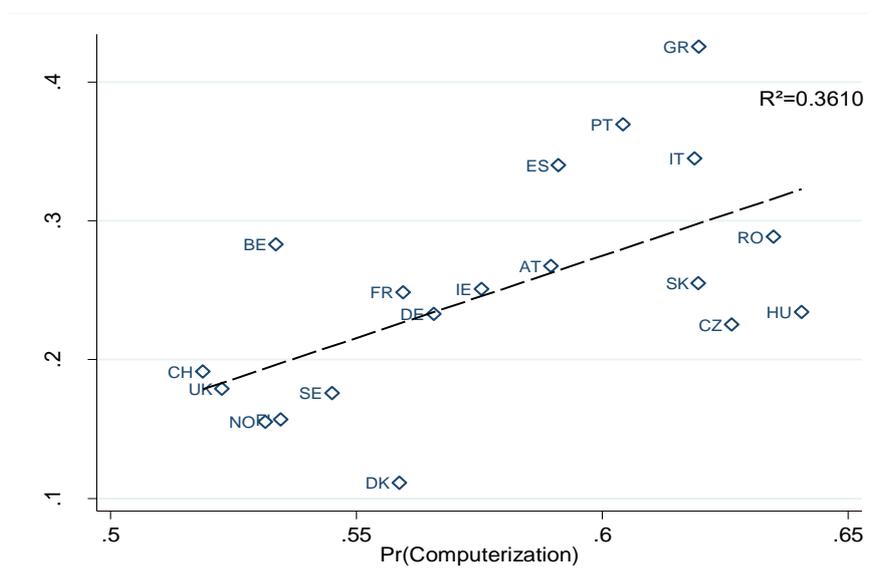
Source: Own computations based on EU LFS 2011-2016. The line (---) presents a linear trend of the relationship between R&D and adult lifelong learning participation rates. Note 1: R&D denotes intramural R&D expenditure (GERD) as a percentage of GDP.

4. Unequal access to lifelong learning between low- and high-educated is worse in societies with a high proportion of routinized jobs.

Polarization between social groups – such as between rich and poor, or lower and more highly educated – promotes routinized work and a low-skill, low-trust production model. These in turn harm working conditions and reduce the value that employees add during production processes. On this assumption, we might expect societies with more routinized jobs also to show greater inequality in access to adult lifelong learning. We found this to be the case (Figure 3). In particular,

we found that the proportion of routinized jobs is an important predictor of inequality in access to lifelong learning between low- and high-educated adults.

Figure 3: Relationship between the probability of computerization of jobs within a country and inequality in access to adult lifelong



learning between lower and more highly educated (HCI-index)

Source: Own computation of probability of computerization of jobs (Pr(Computerization)) based on Frey and Osborne (2017) and using pooled EU LFS data 2011-2016.

5. The costs of adult lifelong learning explain about 0.1 percentage point of the total negative impact on growth of unequal access to adult lifelong learning.

Theories of human capital investment suggest that disadvantaged groups will be deterred from undertaking lifelong learning when course fees are higher, or when they lose income (e.g., because they lose their job). The costs of adult lifelong learning are also higher for employers when what they lose from an employee’s time studying exceeds the benefits gained from the learning activity. In general, in countries where costs are an important barrier to participation in learning, inequality in access to lifelong learning between highly- and low-educated adults is also high. (Denmark, the UK and Switzerland, which combine high perceived costs of adult lifelong learning with low inequality, are notable exceptions.)

POLICY IMPLICATIONS AND RECOMMENDATIONS

On the basis of this research we point to four policy implications:

1. Policies on lifelong learning should be more inclusive.

Low-educated adults are generally more sensitive to the costs associated with lifelong learning than the more highly-educated. At the same time, they perform relatively more routinized jobs, and are paid less: relative to their earnings, therefore, learning activities are more expensive for the poorly-educated than for the highly-educated. Low-educated employees are most in need of

financial support from employers – although they receive it least. In addition, the low-educated are generally more likely to drop out of lifelong learning as adults, in part because of their poor memories of school.

Low-educated adults therefore need more encouragement and emotional support from colleagues at work, and from friends and family members. The negative feelings they associate with education may mean the costs they face in undertaking continuing education or workplace learning are significantly higher. In line with previous literature, we found that low-educated (young) adults, with the pressure of lower incomes, tend not to try to increase their earnings through taking up formal learning opportunities and improving their qualifications – in contrast to the better-educated. This calls for policies on adult lifelong learning to be more inclusive.

2. How the labour market is organised influences inequality in access to lifelong learning.

Routinized jobs contribute to inequalities of power between the lower- and the more highly-educated, and tend to lower the quality of working conditions. Societies with high shares of routinized jobs suffer more from inequality between social groups in access to lifelong learning opportunities at the workplace. This has direct consequences for the economy as a whole. Unequal access to adult lifelong learning between the low- and the highly-educated reduces economic growth. Research and policy should focus on encouraging innovative modes of production that facilitate a more equal society, and on greater security for those at risk in the labour market.

3. Financial instruments can flatten the impact of inequality in learning on growth.

A well-developed system for subsidizing the financial costs of lifelong learning can flatten the impact of inequality in learning on economic growth. However, it will not overcome poor access for the poorly-educated. Financial costs are only a small part of the barriers to participation in lifelong learning, especially when employees expect their employer to pay. Policy should focus on the interaction between methods of production, which are associated with labour costs, and workers' educational attainment: employers invest less in employees who are poorly-educated and perform routinized jobs - and when they find investment in education relatively expensive.

4. Tackle early school leaving.

It is better to prevent school leavers from being poorly-educated than to try to remedy the influence of low attainment in initial education on access to adult lifelong learning (and on economic growth). Policy should tackle inequality in lifelong educational opportunity at an early phase in people's education. This implies continuing efforts to tackle early school leaving. It also implies policy measures to facilitate the transition from secondary to higher education among disadvantaged groups.

RESEARCH PARAMETERS

The ENLIVEN research models how policy interventions in adult education can become more effective. Different work packages focus on the role of governance and policy, participation, workplace learning and adults' well-being. It implements and evaluates an innovative Intelligent Decision Support System to provide a new and more scientific underpinning for policy debate and decision-making on adult learning, especially for young adults. The project investigate these lifelong learning aspects through quantitative and qualitative analyses.

PROJECT IDENTITY

PROJECT NAME	Encouraging Lifelong learning for an Inclusive & Vibrant Europe (ENLIVEN)
COORDINATOR	Professor John Holford University of Nottingham, Nottingham, England, United Kingdom john.holford@nottingham.ac.uk
CONSORTIUM	3s Unternehmensberatung GmbH –Vienna, Austria Bulgarian Academy of Sciences – Institute for the Study of Societies and Knowledge – Sofia, Bulgaria KU Leuven/University of Leuven, Leuven - Belgium Slovak Academy of Sciences/ Slovenskej akadémie vied – Institute for Forecasting/Prognostický ústav –Bratislava, Slovakia Tallinn University/Tallinna Ülikool –Tallinn, Estonia Universidad de Deusto – Bilbao, Spain University of Edinburgh – Edinburgh, Scotland, United Kingdom University of Melbourne – Melbourne, Australia University of Nottingham – Nottingham, England, United Kingdom University of Verona/Università degli Studi di Verona – Verona, Italy
FUNDING SCHEME	European Union Horizon 2020 Framework Programme for Research and Innovation (2014-2020) – Societal Challenge 6 – Europe in a changing world: inclusive, innovative and reflective societies", call YOUNG-3-2015, topic "Encouraging Lifelong learning for an Inclusive and Vibrant Europe (ENLIVEN)" Grant Agreement No 693989
DURATION	October 2016 – September 2019 (36 months).
BUDGET	EU contribution: € 2 499 788.50.
WEBSITE	https://h2020enliven.org/
FOR MORE INFORMATION	Contact: Professor John Holford, john.holford@nottingham.ac.uk Contact: Ruth Elmer, ruth.elmer@nottingham.ac.uk
FURTHER READING	<i>Related ENLIVEN publications:</i> <ul style="list-style-type: none">Boeren, E. (2017). Understanding adult lifelong learning participation as a layered problem. <i>Studies in Continuing Education</i> 39(2), pp. 161-175. https://www.tandfonline.com/doi/abs/10.1080/0158037X.2017.1310096Boyadjieva, P., & Ilieva-Trichkova, P. (published online, 11 Jan 2017). Between Inclusion and Fairness: Social Justice Perspective to Participation in Adult Education. <i>Adult Education Quarterly</i>, 67(2), pp. 91-117. https://doi.org/10.1177/0741713616685398Cabus, S.J. & Stefanik, M. (2018). Good Access to Lifelong Learning for the Low-Educated Accelerates Growth: Evidence from 23 European Countries. Available on ENLIVEN website: https://h2020enliven.org and at https://hiva.kuleuven.be/nl/nieuws/docs/hiva-wp2019-01-sofie-cabus.pdfCabus, S.J., Ilieva-Trichkova, P. & Stefanik, M. (2018). On the Barriers to Participation of Disadvantaged Adults in Lifelong Learning across 28 European countries. ENLIVEN Available on ENLIVEN website: https://h2020enliven.org.Räis, M.-L., & Saar, E. (2017). Participation in job-related training in European countries: The impact of skill supply and demand characteristics. <i>Journal of Education and Work</i>, 30(5), 531–551. doi: 10.1080/13639080.2016.1243229

EUROPEAN POLICYBRIEF

ENCOURAGING LIFELONG LEARNING FOR AN
INCLUSIVE & VIBRANT EUROPE

1ST OCTOBER 2016 – 30TH SEPTEMBER 2019



**Decision support for policy
makers: Building an
intelligent system with
coherent knowledge of
diverse lifelong learning
interventions in EU countries**

ENLIVEN Policy Brief No. 3
September 2018

Rong Qu
Claire Palmer

INTRODUCTION

This policy brief reports research conducted to demonstrate the feasibility of establishing an intelligent decision support system (IDSS) on interventions to support policy making for education and training for young adults in Europe. Although there is rich practical knowledge of what makes educational interventions for these young people successful, and the related literature is extensive, documentation is often scattered and inconsistent in form. Much of it also lacks sufficient detail to support informed decision-making. Here ENLIVEN presents novel research spanning two disciplines (education and computer science) – areas which seldom interact.

The foci of this research are:

- First, we undertake ‘knowledge discovery’ on interventions across EU countries, focusing on programmes for young people Not in Education, Employment and Training (NEETs). The

research findings include a unified template of attributes which represent various interventions (collect as cases), and a similarity measure model which assesses how similar cases are.

- Then an intelligent decision support system (IDSS) is built, based on research findings at the knowledge discovery stage. When a stakeholder is interested in a new case, the IDSS retrieves cases previously stored, ordered by their similarity to the new case. This supports decision-making based on previous programmes. The performance of the IDSS can be further improved by the inclusion, over time, of new cases from policy makers or stakeholders in the unified template.

This work was carried out in Work Packages 8 and 9 of the ENLIVEN project, led by the University of Nottingham.

EVIDENCE AND ANALYSIS

The main research outcomes are summarised in the following two research findings. Corresponding recommendations are presented in the following section.

As a key area of policy focus, young people defined as NEETs (Not in Employment, Education or Training) represent an interesting and representative target group in lifelong learning. Based on the existing rich literature, and discussions within the consortium, NEET programmes were selected as an example for building and demonstrating the decision support system. In future, systems can be built using similar methodologies for other target groups.

Research finding A. A unified template facilitates effective documentation of rich knowledge in policy making practice. At present documents take diverse forms and often lack sufficient detail.

Along with the analysis on the existing documentations in the ENLIVEN consortium, we collected data on interventions addressing NEETs in different countries. The sources of documentation we explored include the following:

- Eurostat: background information aggregated at country level
- CEDEFOP VET toolkit for tackling early leaving database and database of Management Practice
- Government departments / agencies and third sector funders in the UK (England, Northern Ireland, Scotland, Wales)
- CEDEFOP Fields of Training Manual: subject classifications Eurostat: Regions in the European Union Nomenclature of territorial units for statistics
- NUTS 2013/EU-28: Country code, European Commission qualification frameworks.
- EXCEPT project (Horizon 2020: <http://www.except-project.eu/>)

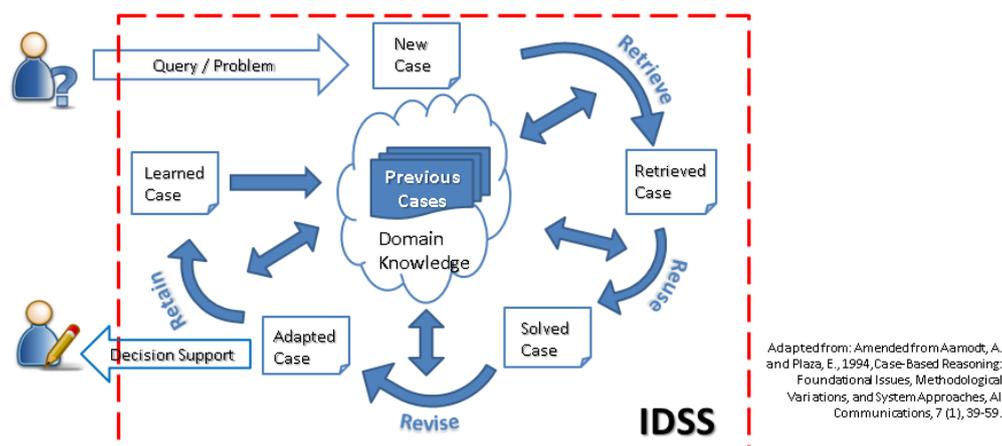
We found that while many policy documents have been archived over the years, quite often they are in highly diverse forms: databases, documents, web sites, brief summaries, free text descriptions, etc. In most of the sources, insufficient detail is documented to provide useful information for future decision making in similar scenarios.

However, some of the sources explored do contain useful information and knowledge. The following contain sufficiently extensive detail to inform knowledge extraction, and we have therefore processed and stored these in the IDSS.

- The STYLE database: a database of youth employment measures created by the STYLE (Strategic Transitions for Youth Labour in Europe) project (<https://www.style-research.eu/>). This database is well structured with relevant attributes, such as programme aim, target group, programme activities, duration, numbers of beneficiaries, and also contains intervention outcomes, evaluations and source data references.
- Black Country Talent Match Annual Report 2016. Talent Match Young and Successful: survey data of young people from the Talent Match programme for Derbyshire and Nottinghamshire, UK, provided by practitioners and used to inform attributes for the case base.
- A survey of programme providers undertaken by ENLIVEN⁷
- Evaluation of the Day One Support for Young People Trailblazer, November 2014, UK Department of Work and Pensions. This is the most complete programme evaluation located. It contains a profile of programme participants, their barriers to work, and the outcomes resulting from attending the programme. The outcomes analysed are both “hard” (number of participants with increased job search activity and finding paid work) and “soft” (increased self-confidence, confidence relating to employment).

In an IDSS, knowledge is usually modelled and stored in the form of rules or cases to assist future decision making in the same or similar scenarios. The IDSS developed by ENLIVEN has focused on NEETs, to demonstrate intelligent decision support for policy making can address a key issue in lifelong learning. As shown in Figure 1, at the centre of the IDSS is a “case base” which stores previous interventions on NEETs as cases. Knowledge from the policy domain is thus modelled in the IDSS to support future decision making. When a new problem or query is input by a user as a new case, the IDSS retrieves the most similar cases for the user, who can then make an informed decision by reusing or revising them. The adapted new cases can be “learned” by the IDSS to improve decision making in future similar scenarios.

Figure 1. A schematic diagram of an IDSS



The IDSS has been built step by step, addressing in the process a number of research issues. These include case representation (a unified template to store the NEETs programmes), and a similarity measure (which assesses similarity between cases so the most useful ones can be retrieved for decision making).

A unified case representation template is needed to represent programmes in the IDSS. Even the documentation of interventions which contain rich detail often lack a commonly used universal

⁷ <https://h2020enliven.org/2017/07/17/info-tool-guide-neet-policy-decisions/>; online from July 2017.

template to facilitate sensible comparisons between interventions and support policy decision making . This is, of course, understandable in the light of the broad range of interventions across a range of different countries, and their different aims, activities and target groups.

To address this, a list of 78 attributes has been collected within the consortium through several rounds of workshop discussions. The resulting new unified universal template (with fields of 78 attributes) stores details of interventions, and models knowledge in policy making for NEETs. A total of 77 interventions have been processed and stored as cases in this IDSS unified template (as of September 2018). A further set of 37 cases is being processed, and will be added in the next stage.

There are also weaknesses in the evaluation of programme outcomes. Where such evaluations exist, they are generally inconsistent. This is a known problem⁸ but little action has been taken to address it. There is a need to assess the most appropriate evaluation techniques for this type of data (for which precise numerical outcomes are difficult to achieve), and to learn from evaluation techniques employed in other social science disciplines such as healthcare.

A similarity measure has been built to assess the similarities between cases. This uses a range of knowledge acquisition and data mining techniques. Among the 78 attributes, four (Locations, Target groups, Aims and Activities) have been identified as key for decision making. For each of these key attributes, categories are extracted as their possible values in different cases. By using clustering and knowledge acquisition, similarities have been obtained between different category values . These are used to calculate the overall similarity between programmes in the IDSS.

The IDSS, now established with a preliminary user interface, will be extended and used to acquire more knowledge; it will be enhanced step by step in the next stage of the project.

Research finding B. Knowledge acquisition across disciplines in building intelligent systems in policy making presents a research challenge and opens interesting future research directions.

Knowledge discovery is always challenging in building an IDSS, especially for complex problems where knowledge is difficult to model, such as policy-making. Based on our research findings, especially the category typology and country-based analysis and knowledge acquisition, 78 attributes (including four key attributes) have been used to assess similarity between interventions.

One of the cases collected (the Talent Match programme) has been intensively analysed using the decision tree approach. This has generated insights into NEETs programmes and demonstrated the value of data mining techniques in building the IDSS. The analysis aims to determine underlying barriers to employment faced by young NEETs using a “Distance to labour market” measure created by Sheffield Hallam University⁹. This considers how likely a young person is to be in work given their characteristics, experiences and capabilities. The decision tree approach is a key data mining techniques in machine learning; it shows we can effectively extract key features and identify the strongest predictors of employment outcomes (Palmer et al. 2018b).

⁸ Mawn, L., et al. (2017) Are We Failing Young People Not in Employment, Education or Training (NEETs)? A Systematic Review and Meta-Analysis of Re-Engagement Interventions. *Systematic Reviews* 6: 16. PMC. Web. 28 Mar. 2017.

⁹ Sanderson, E. & Wilson, I. (2015) *Talent Match Evaluation and Learning Contract: 2013-19 - Common Data Framework: Annual Report*: <https://www4.shu.ac.uk/research/cresr/sites/shu.ac.uk/files/tm-cdf-annual-report-2015.pdf>.

The IDSS we have developed, with its unified representation of programmes, presents an excellent platform for future research to extract extensive knowledge using artificial intelligence data mining techniques.

POLICY IMPLICATIONS AND RECOMMENDATIONS

Recommendation A. A consistent standard of documentation within a coherent framework across countries for future development in research and practice.

The rapid development of intelligent systems across many applications makes pressing demands for the large amount of data collected to be archived and used in coherent and efficient ways for future research and practice. Current policy making documents and related literature do not record documentation and data collection on interventions in a coherent or consistent template. Building and establishing a standard for data recording at the EU level is crucial if the rich knowledge is to be extracted from practitioners and policy makers and used in future decision making.

ENLIVEN has demonstrated such a standard, using a unified template to represent and model various NEET interventions. The same methodology could be extended and applied to other programmes with different target groups or aims across different countries.

The current literature includes no framework, applicable across different countries and locations, incorporating clearly defined stages of the policy making process (associated with the corresponding policy makers and stakeholders). Building a consistent framework, or frameworks, presents a challenging task. It would, however, be highly valuable for practice and research, as well as providing a standard framework for future IDSS development.

Recommendation B. More research schemes supporting inter-disciplinary research within a standardised infrastructure.

Current literature suggests a lack of research at the interface of education and computer science. ENLIVEN presents an exemplar of novel, inter-disciplinary research across two, usually isolated, disciplines, and shows that good progress can be made generating significant research findings and insights. It is important to establish effective infrastructure which will support cross-disciplinary research, and to facilitate and sustain efficient future research collaboration nationally and internationally, to enhance decision making.

RESEARCH PARAMETERS

The ENLIVEN research models how policy interventions in adult education can become more effective. Different work packages focus on the role of governance and policy, participation, workplace learning and adults' well-being. It implements and evaluates an innovative Intelligent Decision Support System and provides a new and more scientific underpinning for policy debate and decision-making on adult learning, especially for young adults. The project investigates these lifelong learning aspects through quantitative and qualitative analyses.

PROJECT IDENTITY

PROJECT NAME	Encouraging Lifelong Learning for an Inclusive & Vibrant Europe (ENLIVEN)
COORDINATOR	Professor John Holford University of Nottingham, Nottingham, England, United Kingdom john.holford@nottingham.ac.uk
CONSORTIUM	University of Nottingham – Nottingham, England, United Kingdom 3s Unternehmensberatung GmbH – Vienna, Austria Bulgarian Academy of Sciences, Institute for the Study of Societies and Knowledge – Sofia, Bulgaria KU Leuven/University of Leuven, Leuven – Belgium Slovak Academy of Sciences, Centre of Social and Psychological Sciences – Bratislava, Slovakia Tallinn University/Tallinna Ülikool – Tallinn, Estonia Universidad de Deusto – Bilbao, Spain University of Edinburgh – Edinburgh, Scotland, United Kingdom University of Melbourne – Melbourne, Australia University of Verona/Università degli Studi di Verona – Verona, Italy
FUNDING SCHEME	European Union Horizon 2020 Framework Programme for Research and Innovation (2014-2020) – Societal Challenge 6 – Europe in a changing world: inclusive, innovative and reflective societies”, call YOUNG-3-2015, topic “Encouraging Lifelong Learning for an Inclusive and Vibrant Europe (ENLIVEN)” Grant Agreement No. 693989
DURATION	October 2016 – September 2019 (36 months).
BUDGET	EU contribution: €2 499 788.50
WEBSITE	https://h2020enliven.org/
FOR MORE INFORMATION	Contact: Professor John Holford john.holford@nottingham.ac.uk Contact: Ruth Elmer ruth.elmer@nottingham.ac.uk
FURTHER READING	<i>Related ENLIVEN publications:</i> <ul style="list-style-type: none">▪ Claire Palmer, Sharon Clancy, Richard Hazledine, Rong Qu. (2018a) “Can Maslow’s Hierarchy of Needs illuminate the problems Young People Face in Finding Employment?”, under preparation, to be submitted to <i>Social Science Computer Review</i>.▪ Claire Palmer, Sharon Clancy, Richard Hazledine, Jason Atkin, Rong Qu. (2018b) “The Effect of the Young and Successful Programme on a young person’s proximity to the labour market”, under preparation, to be submitted to <i>IEEE Transactions on Computational Social Science Systems</i>.▪ Claire Palmer, Sharon Clancy, Jason Atkin, Rong Qu. (2018c) “The need for more evidence to enable the application of Artificial Intelligence to policy making for young people not in employment, education or training (NEETs)”, under preparation, to be submitted to <i>Journal of Computational Social Science</i>.